

AMENDMENTS TO THE CLAIMS

This listing of claims replaces all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS

1. (currently amended) A method of forming a thin film on a substrate, comprising:

providing the substrate in a chamber;

inserting a composite comprising a porous carrier and an amphiphilic material into the chamber, wherein the porous carrier comprises a metal and comprises pores having an average pore size from about 1 micron to about 1,000 microns;

in the chamber, setting at least one of a temperature of the composite from about 20 to about 400° C. and a pressure from about 0.000001 to about 760 torr to induce vaporization of the amphiphilic material; and

recovering the substrate having the thin film thereon.

2. (original) The method of claim 1, wherein the substrate comprises at least one of a glass, a glass having an antireflection coating thereon, silica, germanium oxide, a ceramic, porcelain, fiberglass, a metal, a thermoset, and a thermoplastic.

3. (currently amended) The method of claim 1, wherein the porous carrier comprises pores having an average pore size from about 4 micron 5 microns to about 1,000 500 microns.

4. (original) The method of claim 1, wherein the porous carrier has a porosity so that it absorbs from about 0.001 g to about 5 g of amphiphilic material per cm³ of porous carrier.

5. (currently amended) The method of claim 1, wherein the porous carrier comprises at least one of alumina, aluminum silicate, aluminum, brass, bronze, chromium, copper, gold, iron, nickel, palladium, platinum, silicon carbide, silver, stainless steel, tin, titanium, tungsten, zinc, and zirconium.

6. (original) The method of claim 1, after setting at least one of the temperature and the pressure, keeping the substrate in the chamber for a time from about 10 seconds to about 24 hours.

7. (currently amended) The method of claim 1, wherein the amphiphilic material is represented by at least one of Formulae I, II, V, VI, VII, and RY:

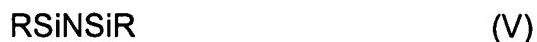


where each R is individually an alkyl containing from about 1 to about 30 carbon atoms, fluorinated alkyl containing from about 1 to about 30 carbon atoms, alkyl ether containing from about 1 to about 30 carbon atoms, or fluorinated alkyl ether containing from about 1 to about 30 carbon atoms, substituted silane, or siloxane; each Z is individually one of halogens, hydroxy, alkoxy and acetoxy; and m is from about 1 to about 3, n is from about 1 to about 3, and m + n equal 4;

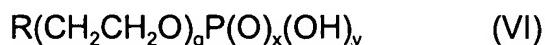


where R is an alkyl containing from about 1 to about 30 carbon atoms, fluorinated alkyl containing from about 1 to about 30 carbon atoms, an alkyl ether containing from about 1 to about 30 carbon atoms, or a fluorinated alkyl ether containing from about 1 to about 30 carbon atoms; S is sulfur; H is hydrogen; m is from about 1 to about 2 and n is from 0 to 1;

RY, where R is an alkyl containing from about 1 to about 30 carbon atoms, fluorinated alkyl containing from about 1 to about 30 carbon atoms, an alkyl ether containing from about 1 to about 30 carbon atoms, or a fluorinated alkyl ether containing from about 1 to about 30 carbon atoms and Y is one of the following functional groups: -COOH, SO₃H, -PO₃, -OH, and -NH₂;



where R is an alkyl containing from about 1 to about 30 carbon atoms, fluorinated alkyl containing from about 1 to about 30 carbon atoms, an alkyl ether containing from about 1 to about 30 carbon atoms, or a fluorinated alkyl ether containing from about 1 to about 30 carbon atoms;



where R is an alkyl containing from about 1 to about 30 carbon atoms, fluorinated alkyl containing from about 1 to about 30 carbon atoms, an alkyl ether containing from about 1 to about 30 carbon atoms, or a fluorinated alkyl ether containing from about 1 to about 30 carbon atoms, q is from about 1 to about 10, and x and y are independently from about 1 to about 4; and



where R is an alkyl containing from about 1 to about 30 carbon atoms, aromatic containing from about 1 to about 30 carbon atoms, fluorinated alkyl containing from about 1 to about 30 carbon atoms, an alkyl ether containing from about 1 to about 30 carbon atoms, or a fluorinated alkyl ether containing from about 1 to about 30 carbon atoms; x is from about 1 to about 4; and y is from about 1 to about 4.

8. (original) The method of claim 1, wherein the pressure is set prior to setting the temperature.

9. (original) The method of claim 1, wherein the temperature is set from about 40 to about 350° C and the pressure is set from about 0.00001 to about 200 torr.

10. (currently amended) The method of claim 1, wherein the thin film is formed at a rate of from about 0.01 nm/sec ~~or more and~~ to about 1 nm/sec ~~or less~~.

11. (original) The method of claim 1, wherein the thin film has a thickness from about 1 nm to about 250 nm.

12.-20. (cancelled)

21. (currently amended) A method of forming a thin film on a substrate, comprising:

providing the substrate in a chamber;

forming an oxide coating on the substrate in the chamber;

inserting a composite comprising a porous carrier and a polyhedral oligomeric silsesquioxane POSS amphiphilic material into the chamber, wherein the porous carrier comprises a metal and comprises pores having an average pore size from about 1 micron to about 1,000 microns;

in the chamber, setting at least one of a temperature of the composite from about 20 to about 400° C. and a pressure from about 0.000001 to about 760 torr to induce vaporization of the POSS amphiphilic material; and

recovering the substrate having the thin film thereon.

22. (currently amended) The method of claim 21, wherein the polyhedral oligomeric silsesquioxane POSS amphiphilic material comprises at least one selected

from the group consisting of poly(p-hydroxybenzylilsesquioxane); poly(p-hydroxybenzylilsesquioxane-co-methoxybenzylilsesquioxane); poly(p-hydroxybenzylilsesquioxane-co-t-butylilsesquioxane); poly(p-hydroxybenzylilsesquioxane-co-cyclohexylilsesquioxane); poly(p-hydroxybenzylilsesquioxane-co-phenylilsesquioxane); poly(p-hydroxybenzylilsesquioxane-co-bicycloheptylilsesquioxane); poly(p-hydroxyphenylethylilsesquioxane); poly(p-hydroxyphenylethylilsesquioxane-co-p-hydroxy- α -methylbenzylilsesquioxane); poly(p-hydroxyphenylethylilsesquioxane-co-methoxybenzylilsesquioxane); poly(p-hydroxyphenylethylilsesquioxane-co-t-butylilsesquioxane); poly(p-hydroxyphenylethylilsesquioxane-co-cyclohexylilsesquioxane); poly(p-hydroxyphenylethylilsesquioxane-co-phenylilsesquioxane); poly(p-hydroxyphenylethylilsesquioxane-co-bicycloheptylilsesquioxane); poly(p-hydroxy- α -methylbenzylilsesquioxane); poly(p-hydroxy- α -methylbenzylilsesquioxane-co-p-hydroxybenzylilsesquioxane); poly(p-hydroxy- α -methylbenzylilsesquioxane-co-methoxybenzylilsesquioxane); poly(p-hydroxy- α -methylbenzylilsesquioxane-co-t-butylilsesquioxane); poly(p-hydroxy- α -methylbenzylilsesquioxane-co-cyclohexylilsesquioxane); poly(p-hydroxy- α -methylbenzylilsesquioxane-co-phenylilsesquioxane); poly(p-hydroxy- α -methylbenzylilsesquioxane-co-bicycloheptylilsesquioxane); and poly(p-hydroxybenzylilsesquioxane-co-p-hydroxyphenylethylilsesquioxane).

23. (currently amended) The method of claim 21, wherein the thin film is formed at a rate of from about 0.05 nm/sec ~~or more~~ and to about 0.5 nm/sec ~~or less~~.

24. (new) The method of claim 21, wherein the metal comprises at least one selected from the group consisting of aluminum, brass, bronze, chromium, copper, gold, iron, nickel, palladium, platinum, silver, stainless steel, tin, titanium, tungsten, zinc, and zirconium.

25. (new) The method of claim 21, wherein the composite further comprises at least one of a non-polar organic solvent, a film forming catalyst, and a quencher.

26. (new) The method of claim 1, wherein the composite further comprises at least one of a non-polar organic solvent, a film forming catalyst, and a quencher.

27. (new) A method of forming a thin film on a substrate, comprising:

providing the substrate in a chamber;

inserting a composite comprising a porous carrier and an amphiphilic material into the chamber, wherein the porous carrier comprises at least one metal selected from the group consisting of aluminum, brass, bronze, chromium, gold, iron, nickel, palladium, platinum, silver, stainless steel, tin, titanium, tungsten, zinc, and zirconium and the porous carrier comprises pores having an average pore size from about 1 micron to about 1,000 microns;

in the chamber, setting at least one of a temperature of the composite from about 20 to about 400° C. and a pressure from about 0.000001 to about 760 torr to induce vaporization of the amphiphilic material; and

recovering the substrate having the thin film thereon.

28. (new) The method of claim 27, wherein the thin film is formed at a rate from about 0.01 nm/sec to about 1 nm/sec.

29. (new) The method of claim 27, wherein the composite further comprises at least one of a non-polar organic solvent, a film forming catalyst, and a quencher.

30. (new) The method of claim 27, wherein the porous carrier has a porosity so that it absorbs from about 0.001 g to about 5 g of amphiphilic material per cm³ of porous carrier.

31. (new) A method of forming a thin film on a substrate, comprising:

- providing the substrate in a chamber;
- forming an oxide coating on the substrate in the chamber;
- inserting a composite comprising a porous carrier and a polyhedral oligomeric silsesquioxane amphiphilic material into the chamber, wherein the porous carrier comprises at least one metal selected from the group consisting of aluminum, brass, bronze, chromium, gold, iron, nickel, palladium, platinum, silver, stainless steel, tin, titanium, tungsten, zinc, and zirconium and the porous carrier comprises pores having an average pore size from about 1 micron to about 1,000 microns;
- in the chamber, setting at least one of a temperature of the composite from about 20 to about 400° C. and a pressure from about 0.000001 to about 760 torr to induce vaporization of the POSS amphiphilic material; and
- recovering the substrate having the thin film thereon.

32. (new) The method of claim 31, wherein the thin film is formed at a rate from about 0.01 nm/sec to about 1 nm/sec.